

NATIONAL RESEARCH COUNCIL

COMMISSION ON LIFE SCIENCES

2101 Constitution Avenue Washington, D. C. 20418

EXECUTIVE DIRECTOR

August 26, 1996

Frank C. Hawkins, P.E.
Director, Office of International
Health Programs (EH-63)
U.S. Department of Energy
Washington, D.C. 20585

Dear Mr. Hawkins:

On behalf of the Commission on Life Sciences and the Board on Radiation Effects Research, I am pleased to enclose a copy of a NRC Letter Report. This Letter Report is in response to your request for recommendations regarding the committee's deliberations following a binational meeting of U.S. and Japanese working groups studying the atomic bomb dosimetry relevant to Hiroshima and Nagasaki. The meeting was held May 22-23, 1996, in Irvine, California. The report, signed by the chairman of the NRC Committee on Dosimetry for the Radiation Effects Research Foundation (RERF), Warren K. Sinclair, represents the unanimous opinion of the committee. It was prepared in order to provide advice in a timely manner and we hope that it meets your needs and the needs of the U.S. Department of Energy.

Consistent with NRC policy, we will provide copies of the Letter Report to persons who request copies. The committee and staff look forward to continuing their work with you.

Sincerely,



Paul Gilman, Ph.D.
Executive Director
Commission on Life Sciences

Enclosure: NRC Letter Report

cc: Warren K. Sinclair, Ph.D.
John D. Zimbrick, Ph.D.
Evan Douple, Ph.D.
Charles Arbanas
Paul Seligman, M.D., M.P.H.
Reports Review Committee

NATIONAL RESEARCH COUNCIL

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BOARD ON RADIATION EFFECTS RESEARCH

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August 26, 1996

Frank C. Hawkins, P.E.
Director, Office of International Health Programs (EH-63)
U.S. Department of Energy
Washington, DC 20585

Dear Mr. Hawkins:

The National Research Council (NRC) Committee on Dosimetry for the Radiation Effects Research Foundation (RERF) is a small committee of approximately 6 members which was formed in 1988 to oversee the dosimetry activities associated with the RERF in Hiroshima and Nagasaki. Initially the committee was charged to oversee the ongoing uncertainty analysis and its documentation, to review the plans for the assessment of doses to factory workers and terrain-shielded survivors at Nagasaki, and to oversee the resolution of the difference between measured and calculated doses at Hiroshima. During the past 8 years, that committee has been studying the dosimetry research activities, dose classifications, and dose measurements relevant to the RERF sponsored by the U.S. Departments of Energy and Defense. At the same time, Japan has had a dosimetry oversight committee which has been acting as an official U.S. counterpart. On occasion the U.S. and Japanese committees have met together to exchange information and assessments and to discuss future goals and experiments.

A joint meeting was held of the Committee on Dosimetry for the RERF and a Japanese Dosimetry Working Group on May 22-23, 1996 at the National Academy of Sciences' Beckman Center in Irvine, California. The NRC committee members included Rufard Alsmiller, Robert Christy, Alvin Weinberg, Wayne Lowder, Keran O'Brien, and me. Five representatives of the Japanese dosimetry working group (Soichiro Fujita, Masaharu Hoshi, Toshiso Kosako, Takashi Maruyama, and Kiyoshi Shizuma) made presentations and participated in the discussions. Also present were some members of the former U.S. working group on the DS86 dosimetry system who are still active in dosimetry work, including Dean Kaul, William Woolson, and Tore Straume. Additionally, representatives of U.S. DOE (Libby White), U.S. DOD-DNA (David Auton, John Bliss, and Robert Young), RERF (Dale Preston), and the Japanese Ministry of Health and Welfare (Hiroshi Maruyama) were present.

The meeting participants reviewed recent progress in A-bomb dosimetry work in the U.S. and in Japan and summarized the current status of the dosimetry. At the meeting, the joint working groups agreed upon a set of recommendations. The U.S. DOE representative present, Libby White, asked the NRC committee to write a brief letter report to the Office of International Health Programs summarizing the recommendations which were endorsed by the NRC committee.

As a preamble to the recommendations, I should emphasize that modern radiation protection is based on the risk coefficients for cancer derived from the A-bomb survivor study at Hiroshima and Nagasaki. The dosimetry of the survivors, which is used in the denominator in the risk coefficient, is as important as the assessment of radiation-induced cancers in the survivors. Consequently, the dosimetry must be studied until uncertainties in it can be reduced to a reasonable level. The uncertainty in the fast-neutron components at Hiroshima and Nagasaki, which are in doubt by perhaps a factor of 2 to 5 at Hiroshima, especially require urgent investigation. The urgency of the investigation is mandated by the fact that risk estimates are ongoing and epidemiology studies are constantly under revision. In addition, key scientists who have been studying RERF dosimetry are retiring, research teams are disbanding and facilities are losing their capability to conduct the needed studies due to a lack of funding, and copper wire from defined locations in the two cities needs to be located or it will be lost forever. To that end, the NRC committee makes the following recommendations:

- 1. That investigators vigorously pursue experiments that will lead to improved confidence in a revised DS86.**
- 2. That investigations to resolve the neutron uncertainty be pursued, including**
 - **Evaluation (quality assurance) and intercomparison of U.S. and Japanese measurements of thermal neutrons in order to assess the handling of background problems (including the use of samples from long distances) and to assess total uncertainty in each measurement.**
 - **Application of the ^{63}Cu (np) ^{63}Ni reaction for fast-neutron measurements by both the U.S. and Japan (this requires an intensive search for copper samples, particularly up to 500m and beyond, if possible, in both Hiroshima and Nagasaki).**
 - **Calculations of weapon leakage and nitrogen cross-section experiments.**
- 3. That a revised DS86 include a re-evaluation of gamma rays at Hiroshima, yield, height of burst, the U.S. Army map (survivor locations), and shielding.**
- 4. That a strong effort be initiated to quantify uncertainties in all phases of DS86 and any later revision with a view to upgrading all estimates of uncertainty that are an integral part of the dosimetry system.**

The specific recommendations include additional scientific work that needs to be done. While some of the recommendations are perhaps more appropriate to be made to DOD-DNA, two of the projects are specifically directed to DOE. The first of these, identified as recommenda-

tion 2, first bullet, involves the setting up of a small team composed of 2 knowledgeable investigators, 1 U.S. and 1 Japanese, to make a thorough examination of all measurements of neutron activation in the U.S. and Japan (cobalt, chlorine, and europium). Examination of these measurements by the U.S. and Japanese groups should pay special attention to the handling of background and the assessment of uncertainties (additional background measurements involving distant samples may be necessary). The aim is to put all of the measurements on a common basis, thereby permitting consistent appraisal and facilitating judgments about their relative significance (a quality assurance evaluation). The second recommendation (second bullet) concerns the development of the ^{63}Cu (np) ^{63}Ni reaction for fast-neutron measurement. Similar work will be done in Japan by Dr. Shibata but using a different assay system. The committee members believe that the conduct of these two projects is vital to our future knowledge of risk-estimation and the basis of radiation protection standards world-wide.

Yours sincerely,



Warren K. Sinclair, Ph.D.
Chairman
Committee on Dosimetry for RERF

cc: Paul Gilman
John Zimbrick
Paul Seligman
Libby White
Charles Arbanas
Report Review Committee